Blending role-playing games and computer agent-based simulation to share representations of socio-ecosystems with local stakeholders

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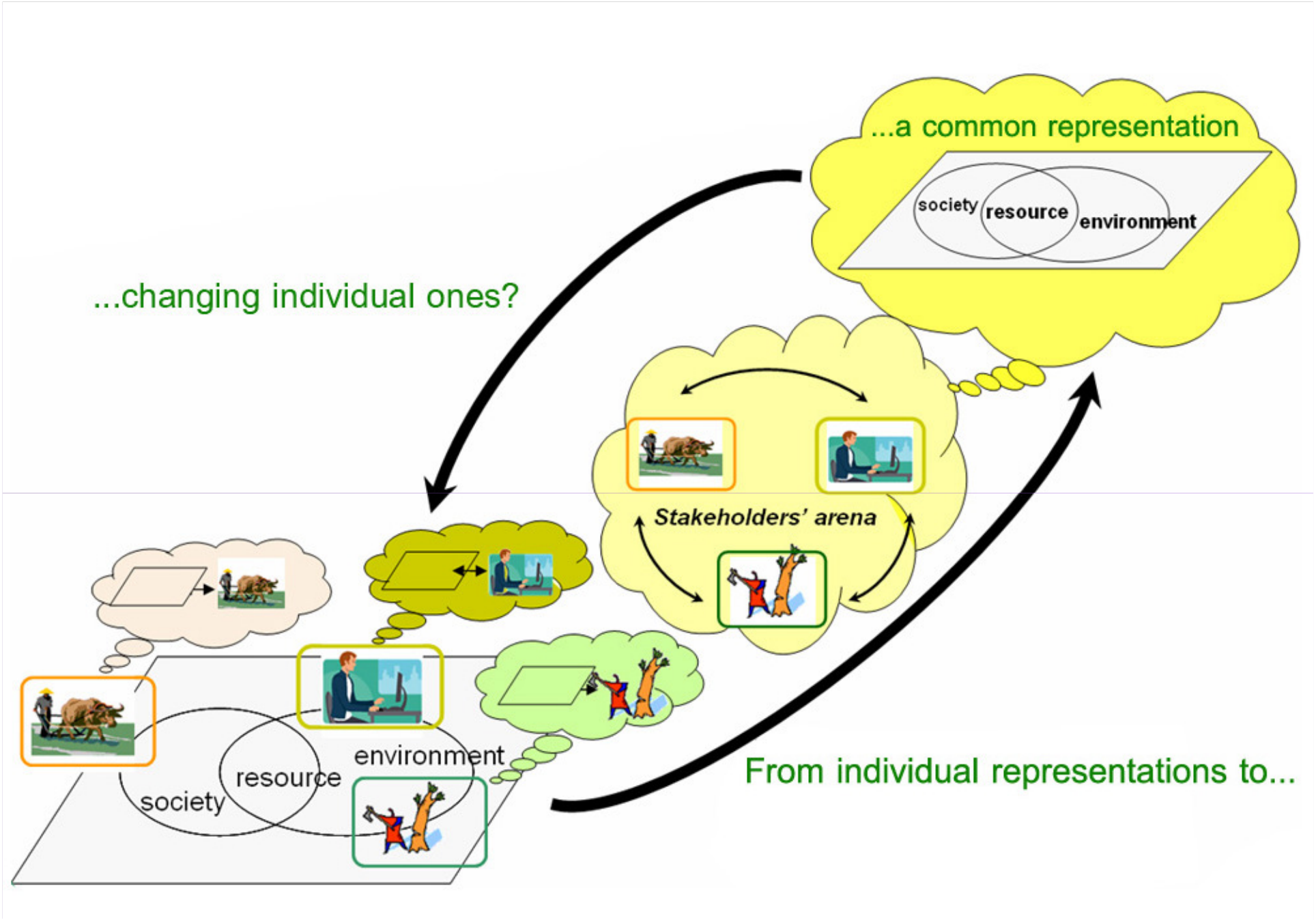
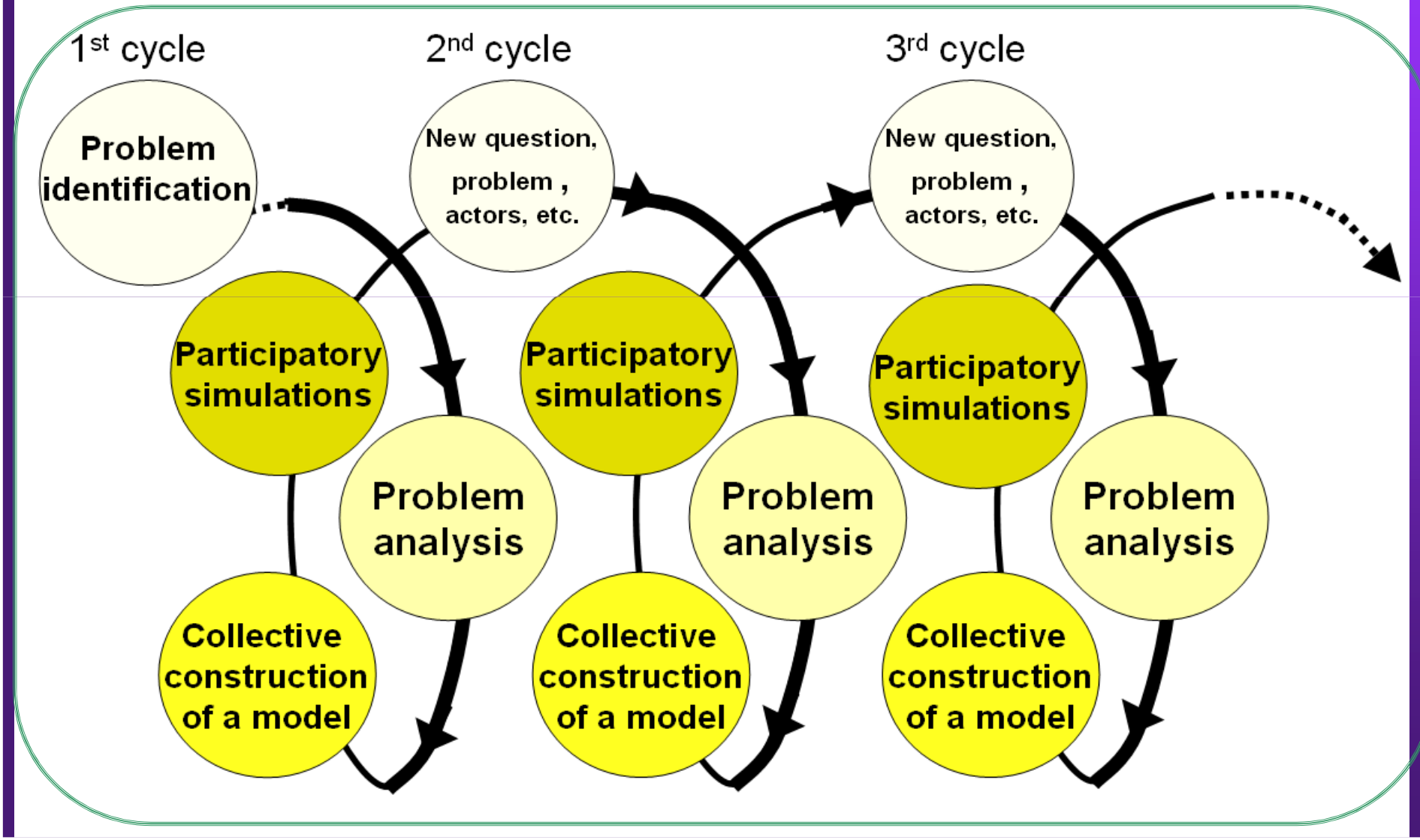
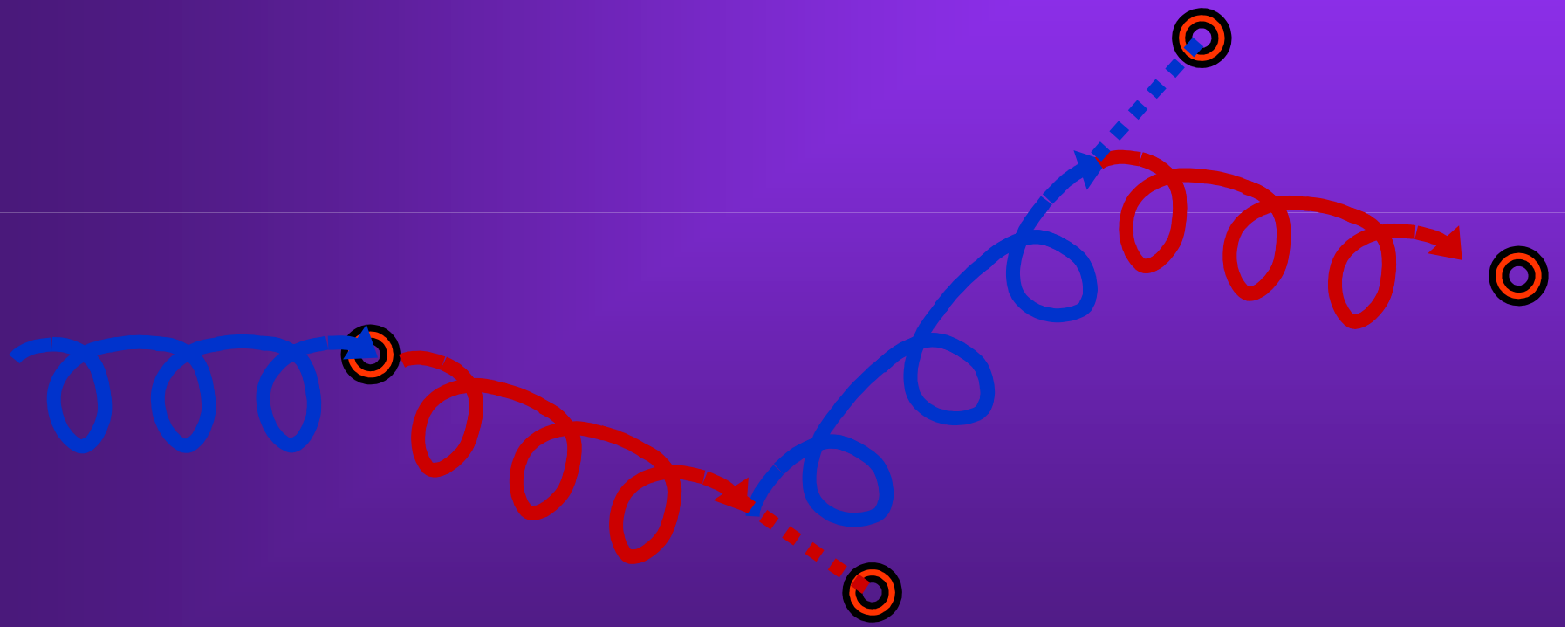

...a common representation
society
resource
environment
...changing individual ones?
Stakeholders' arena
environment
resource
society
From individual representations to...

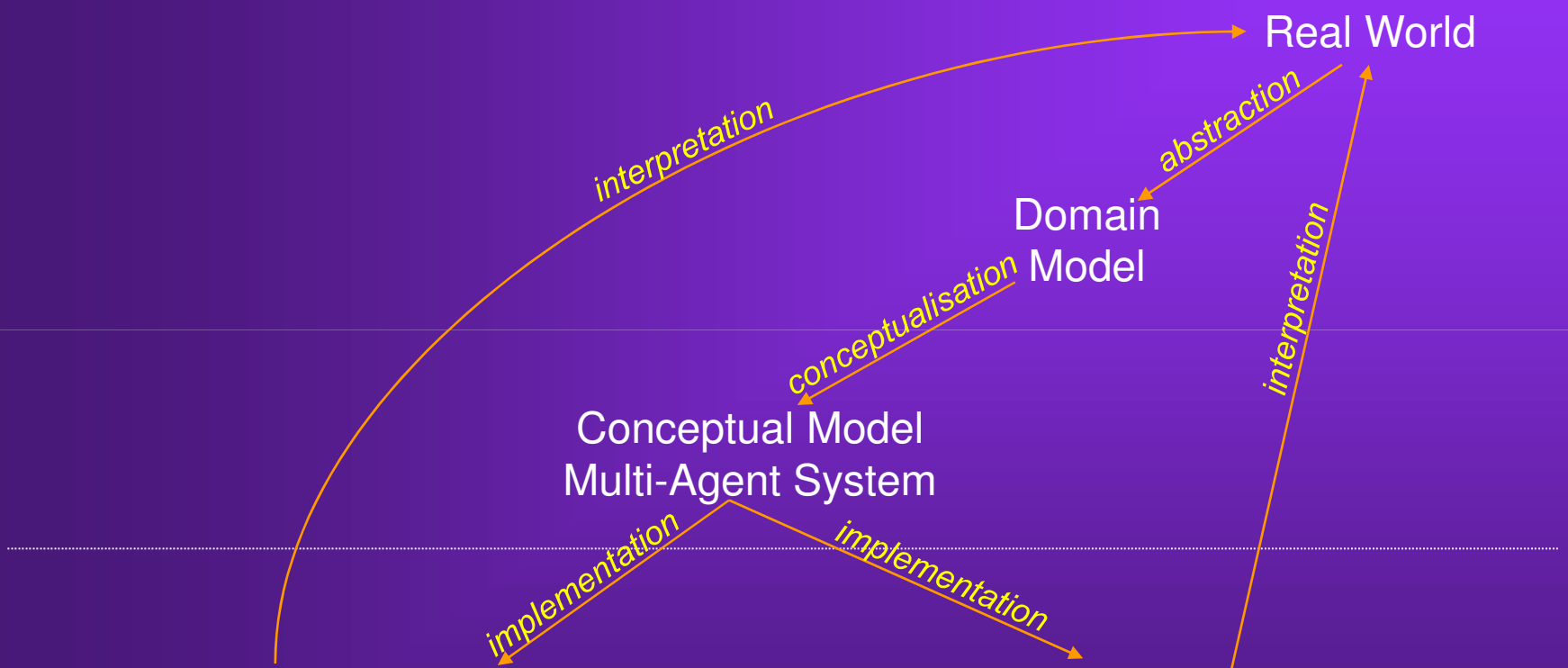
A continuous and iterative process



An adaptive process driven by participants



ABM and RPG are artefacts representing the real world as a Multi-Agent System



Simulation Model based on Virtual Agents

Agent-Based Model

All the decisions are computer-made

Simulation Model based on Human Agents (Players)

Role-Playing Game

All the decisions are human-made

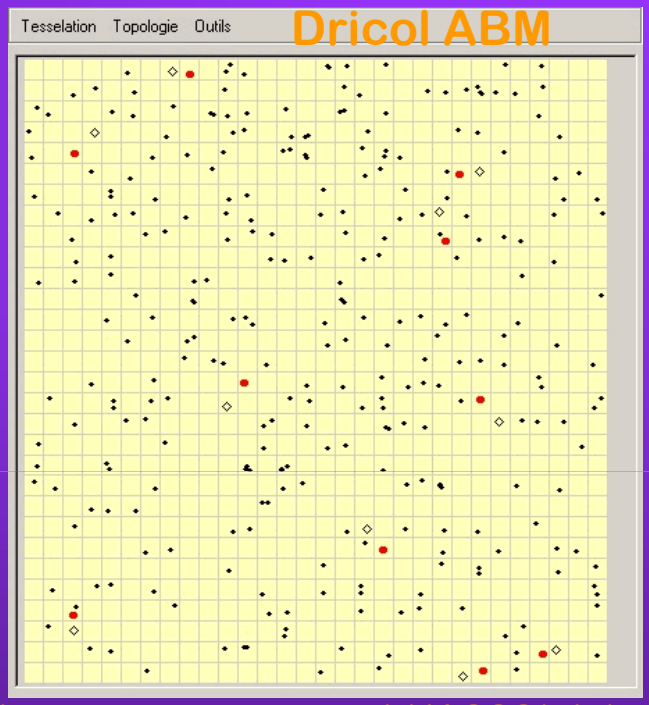
What can agents do, practically?

1. *Perceiving* their environment (incl. other agents)

2. *Performing* via a set of behaviours
   - *Motion*
   - *Communication*
   - *Action* on their environment

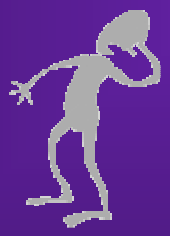
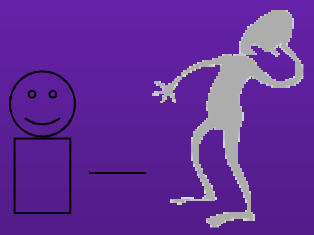
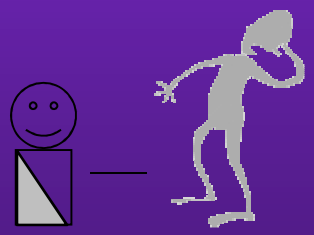
3. *Memorizing*
   record of previous states and actions

4. *Making decisions (policy):* set of rules, heuristics or strategies that determines, given their present situation and history, what behaviours they will now carry out



http://www.soc.surrey.ac.uk/JASSS/4/2/3.html

Various types of computational agents

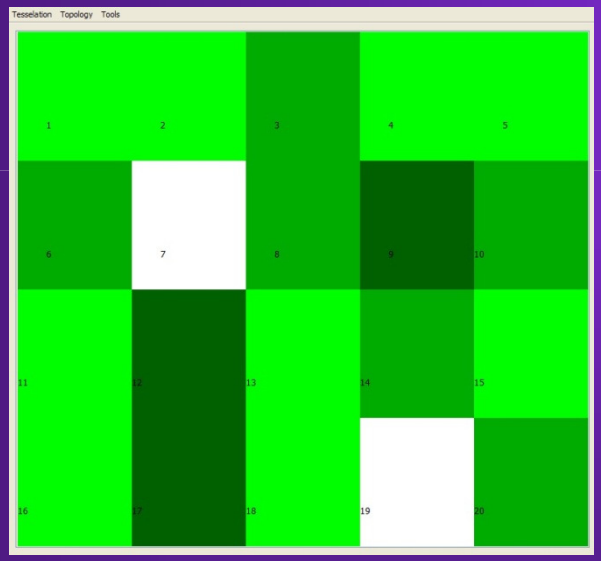
Nature of the decision	100% human		Intermediate	100% computerised
Typology of computational agents	human agent = player  no avatar	simple composite agent  non-decision-making avatar	hybrid composite agent  partial decision-making avatar	computerised agent = virtual agent  autonomous avatar

ReHab, a RPG to convey a message: participatory modelling and simulation as a platform for communication

ReHab game board

Biomass level

3
2
1
0



Each green square holds some resource biomass, the darker the more. The resource has a specific renewing process (hidden rule).

2 roles: Harvester and Park Manager

Harvesting clan:

- each clan controls up to four harvesters
- objective: maximizing the 'resource' harvest by the end of the game

Park Manager:

- one pair of players
- objective: preserving the breeding ground of an endangered migratory bird

2 scenarios of 5 rounds

Individual:(no communication)

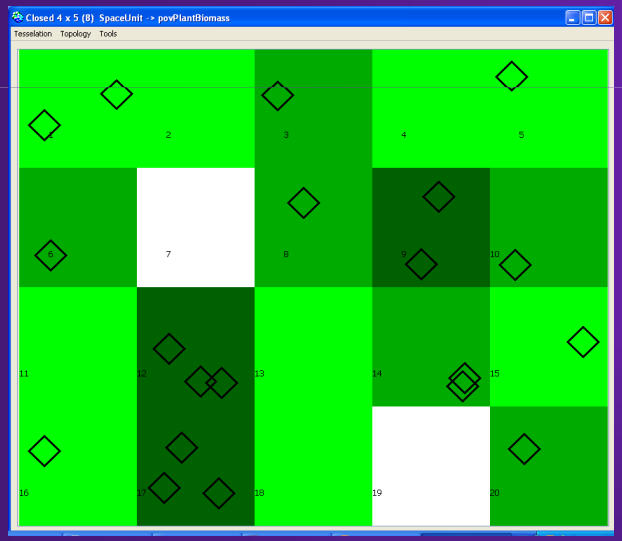
Collective (free discussion)

ReHab Round 1

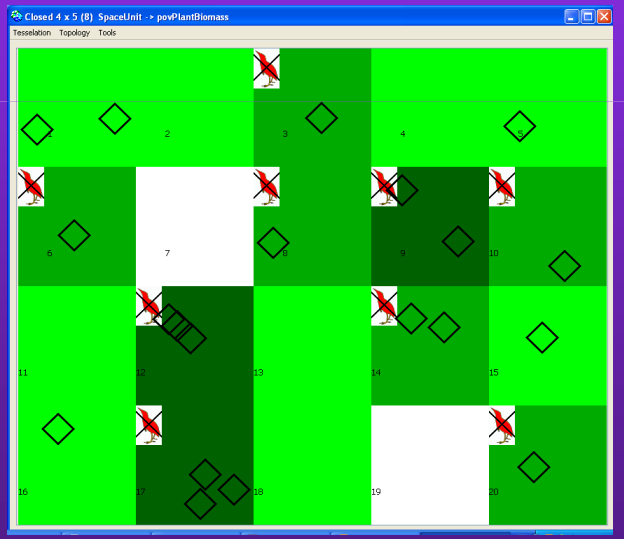
Decisions (synchronous & anonymous)

	M1	M2	M3	M4
Clan 1	9	10	8	3
Clan 2	1	6	14	15
Clan 3	12	9	17	14
Clan 4	12	12	17	17
Clan 5	20	5	1	16

Visualisation (public)



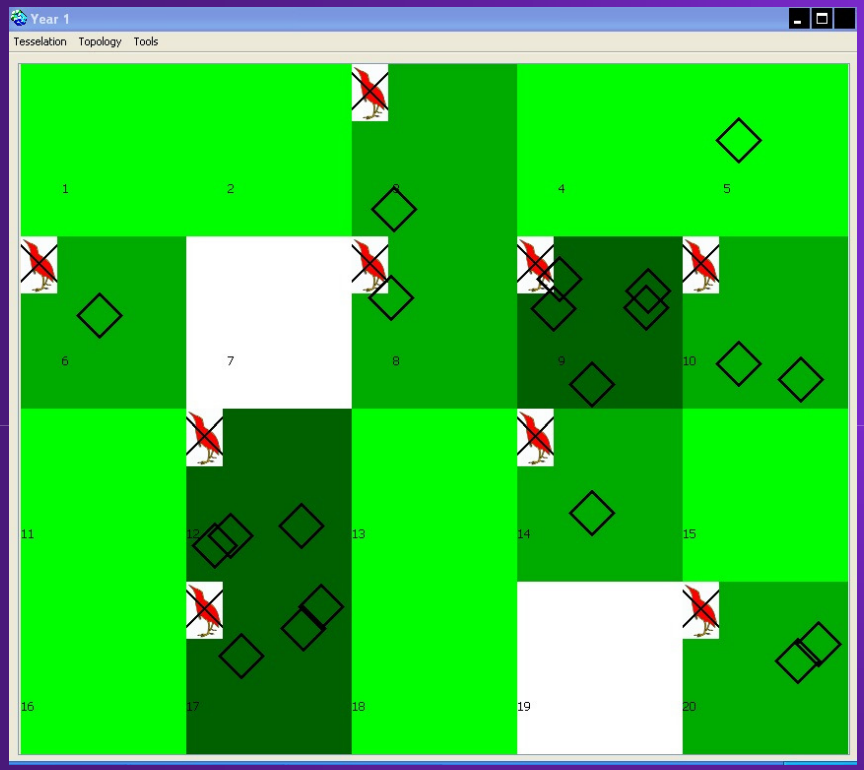
Visualisation (private)



Results (private)

	M1	M2	M3	M4
Clan 1	2	2	2	2
Clan 2	0	2	0	1
Clan 3	1	1	2	2
Clan 4	0	2	0	1
Clan 5	2	1	1	1

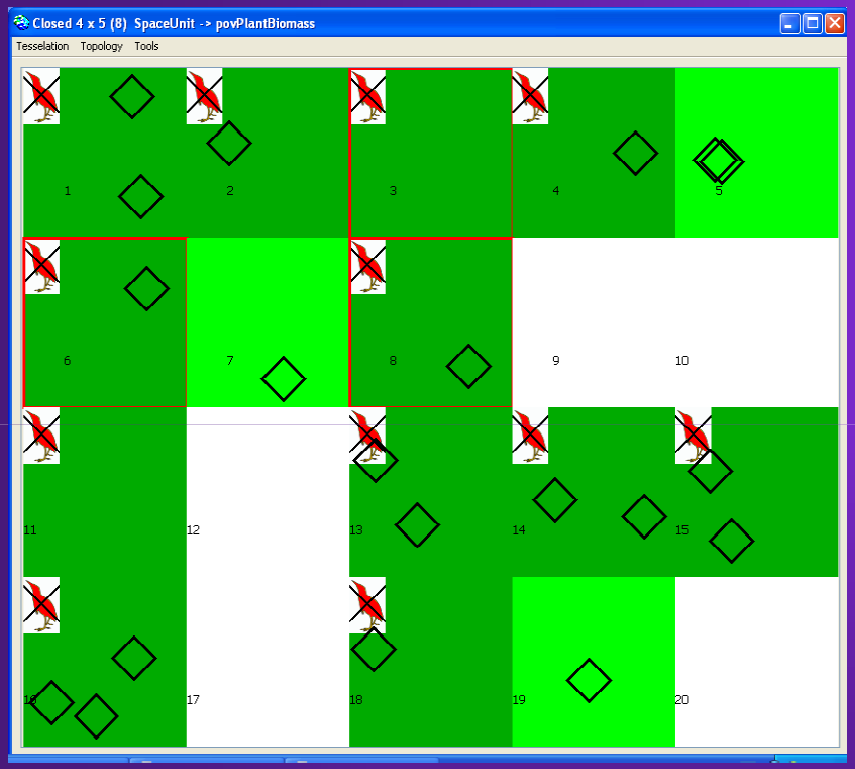
Rehab Replay - Round 1



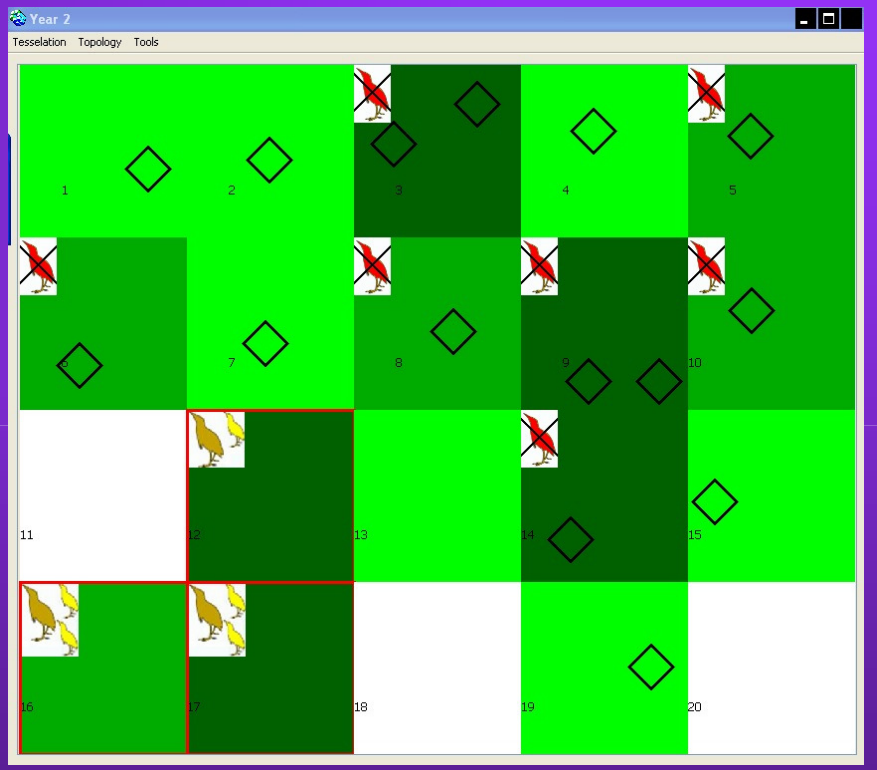
Scenario 1

Scenario 2

Rehab Replay - Round 2

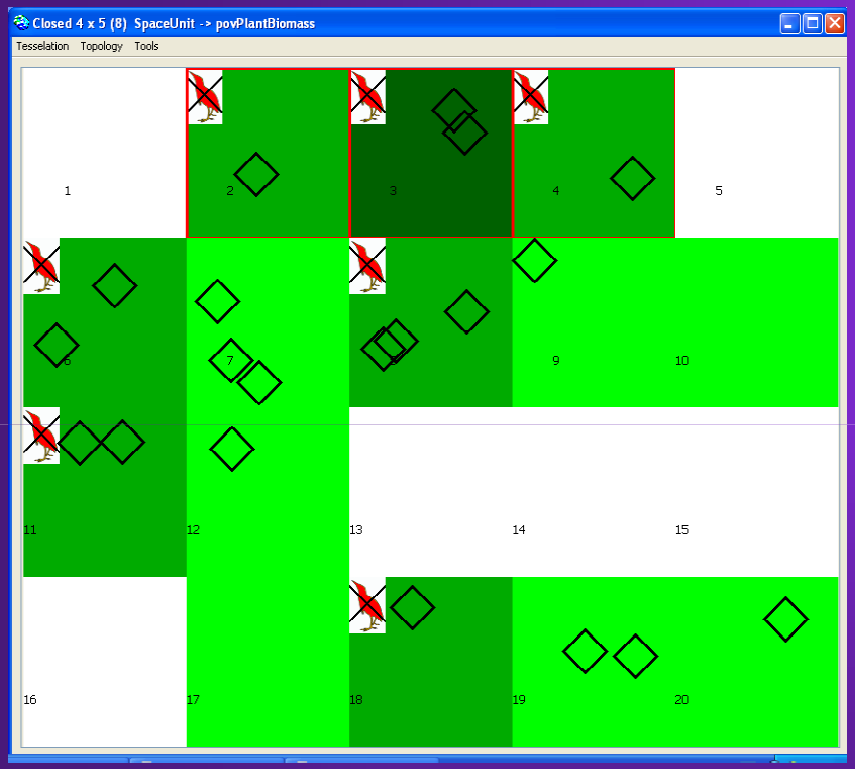


Scenario 1



Scenario 2

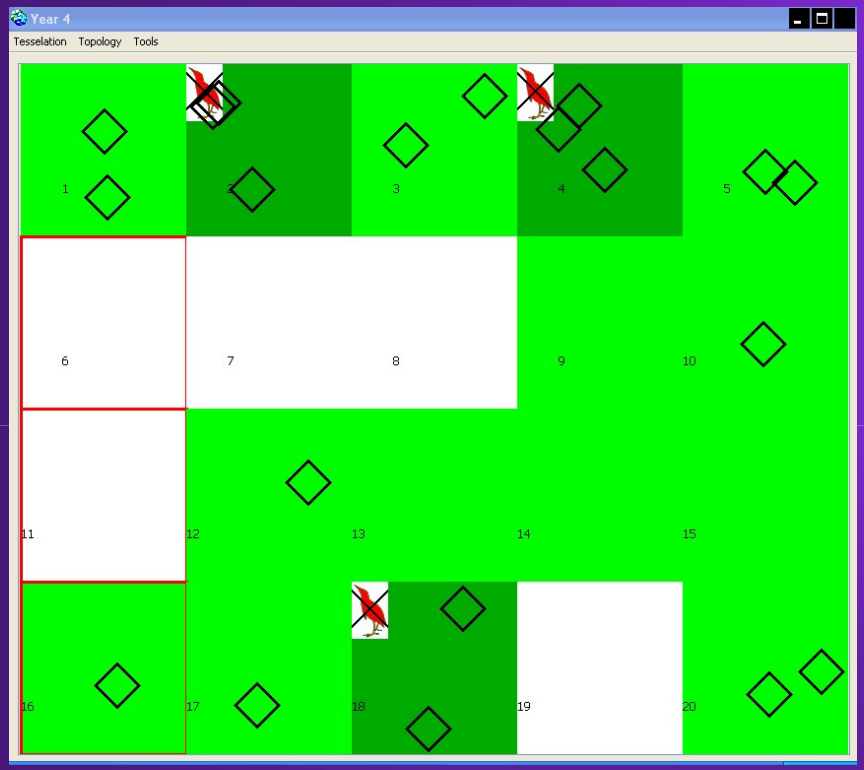
Rehab Replay - Round 3



Scenario 1

Scenario 2

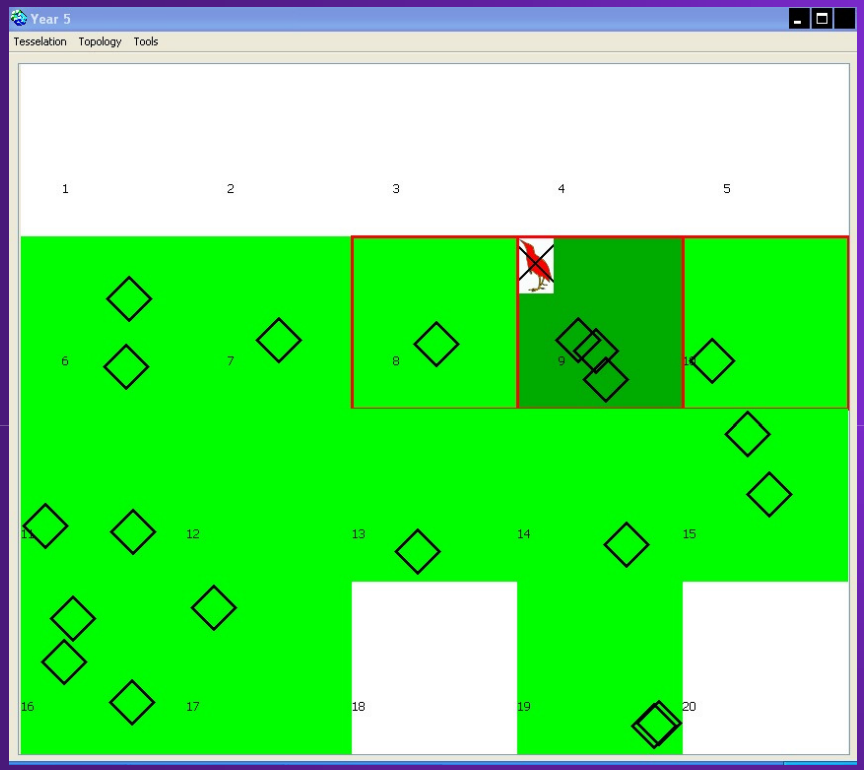
Rehab Replay - Round 4



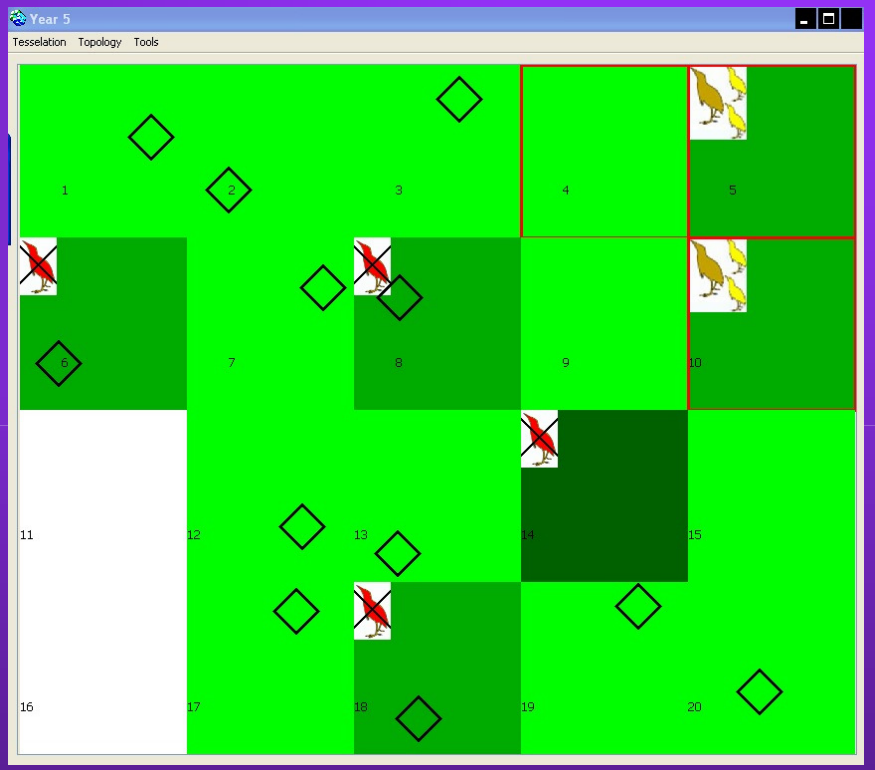
Scenario 1

Scenario 2

Rehab Replay - Round 5

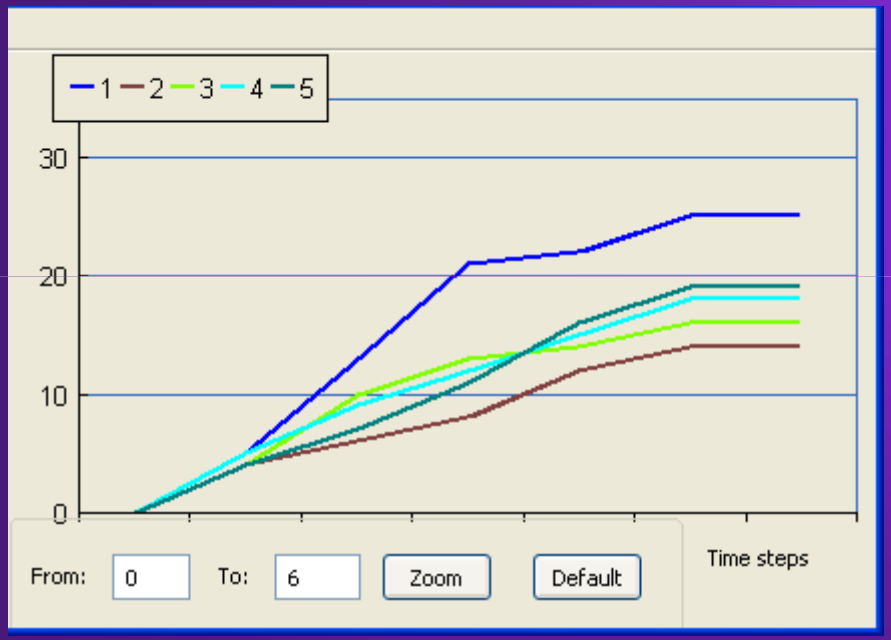


Scenario 1



Scenario 2

Coordination at work

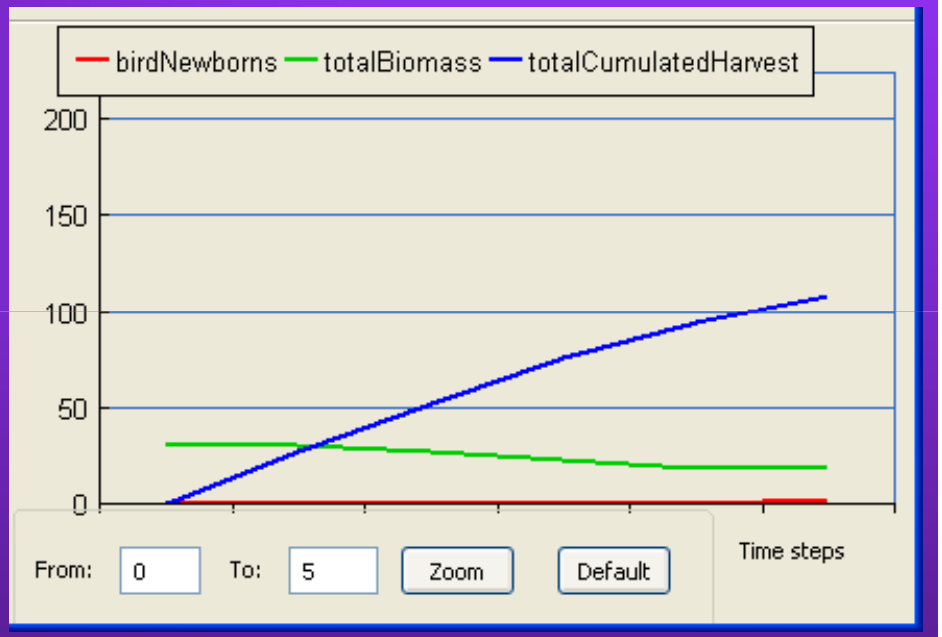


Scenario 1

Scenario 2

Results are driven by the way players communicate

Scenario 2, Brisbane June 2009



Scenario 2, Bangkok May 2009


Closed 4 x 5 (8) SpaceUnit -> povPlantBiomass
Tesselation Topology Tools
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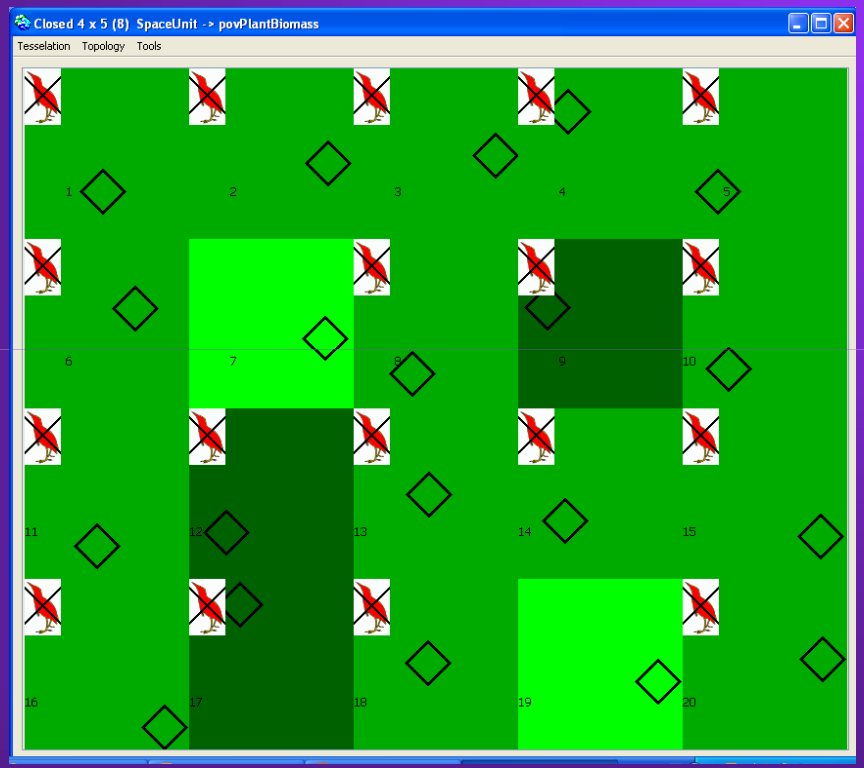
Closed 4 x 5 (8) SpaceUnit -> povPlantBiomass
Tesselation Topology Tools
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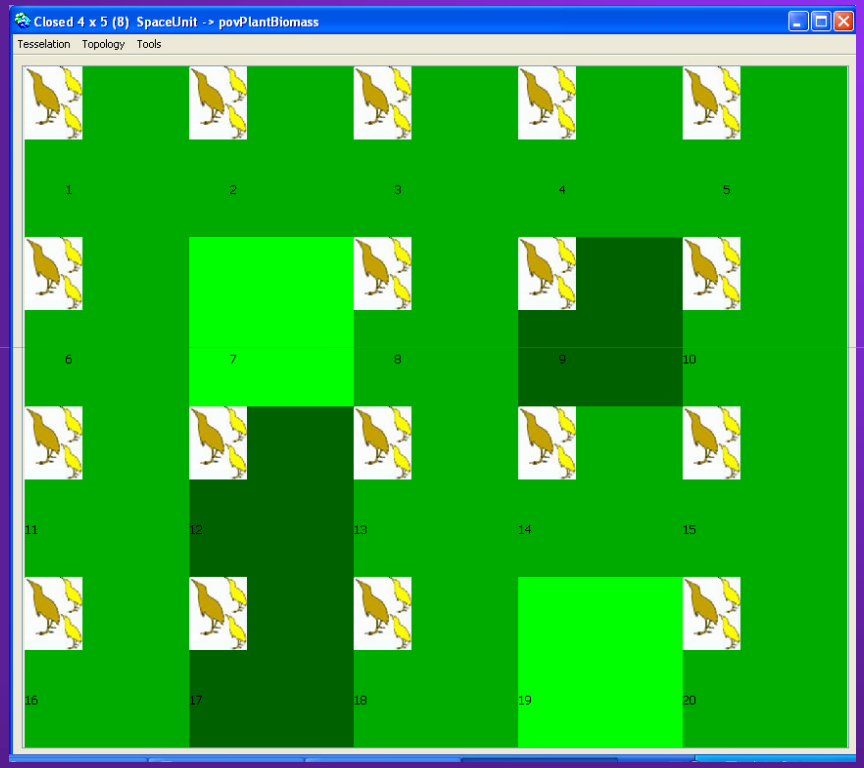
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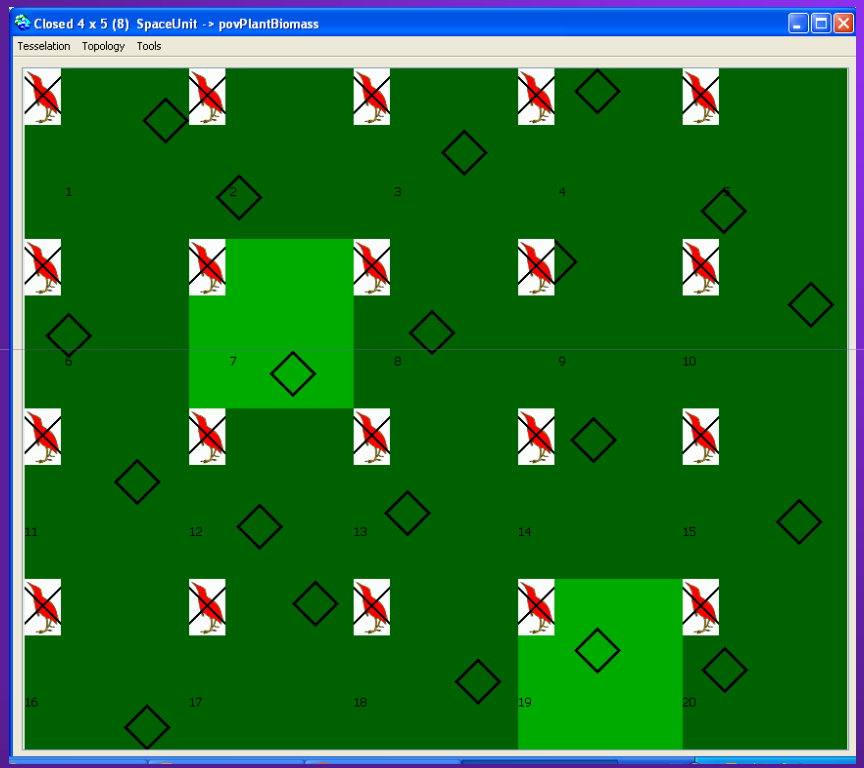
Closed 4 x 5 (8) SpaceUnit -> povPlantBiomass
Tesselation Topology Tools
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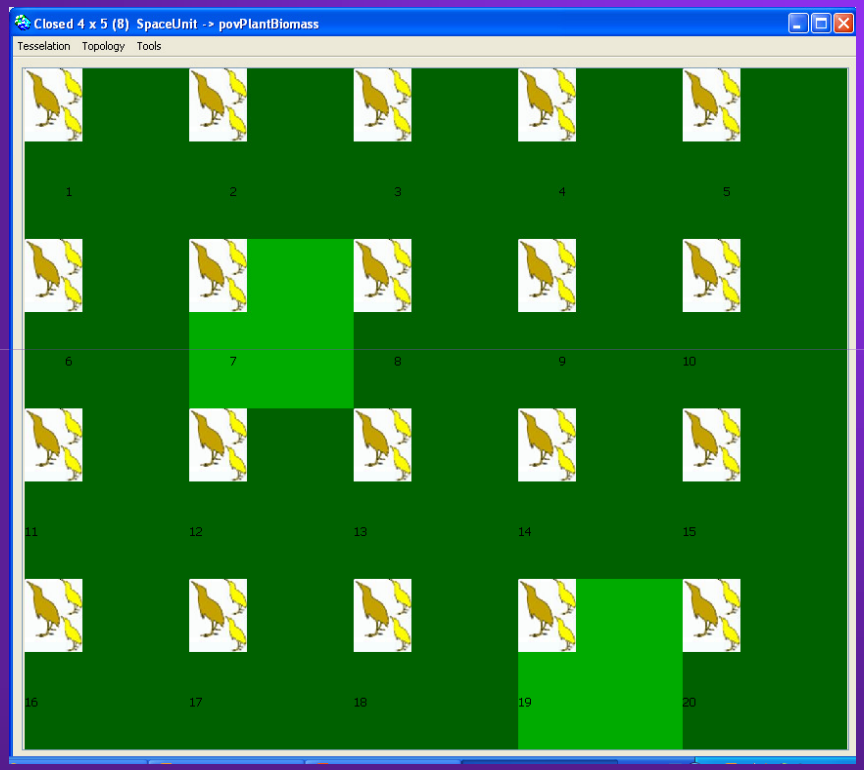
Closed 4 x 5 (8) SpaceUnit -> povPlantBiomass
Tesselation Topology Tools
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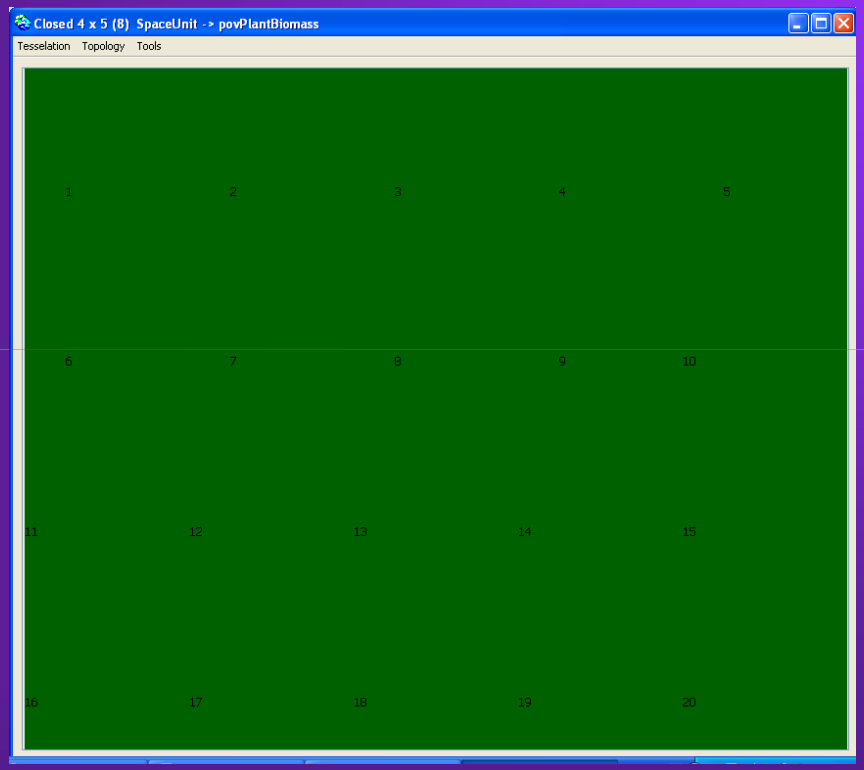
Closed 4 x 5 (8) SpaceUnit -> povPlantBiomass
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birdNewborns
totalBiomass
totalCumulatedHarvest
100
80
60
40
20
0
From:
0
To:
5
Zoom
Default
Time steps


birdNewborns
totalBiomass
totalCumulatedHarvest
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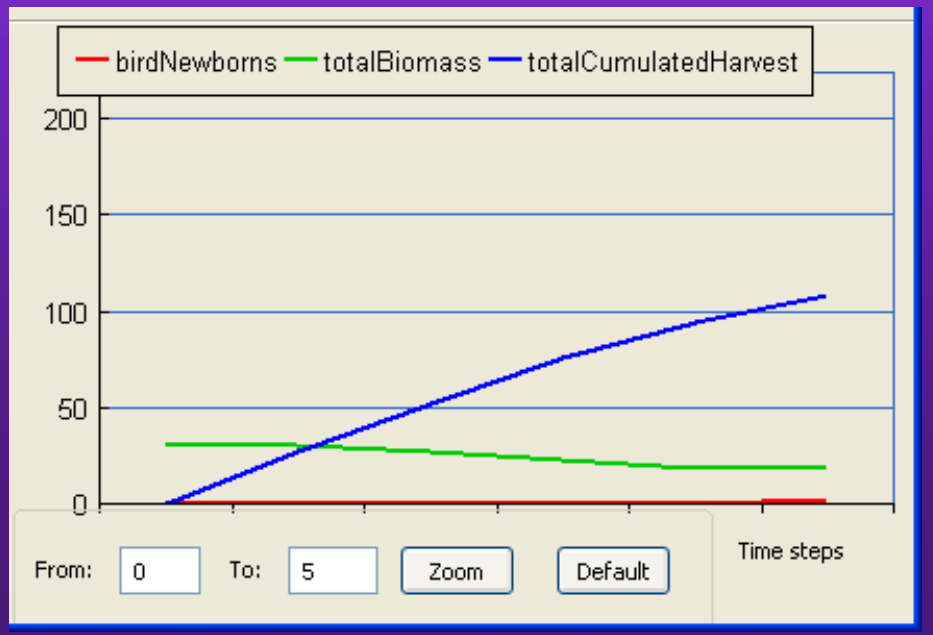
Zoom
Default
Time steps


birdNewborns
totalBiomass
totalCumulatedHarvest
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To:
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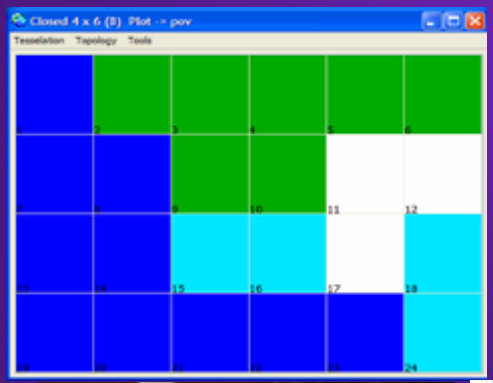
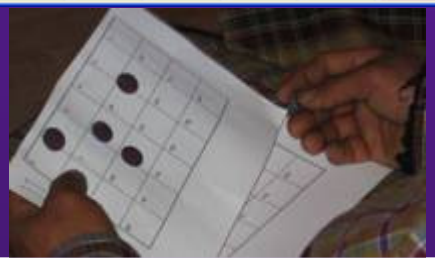
Default
Time steps

Radi: facilitating the understanding of grazing land conflict in Bhutan



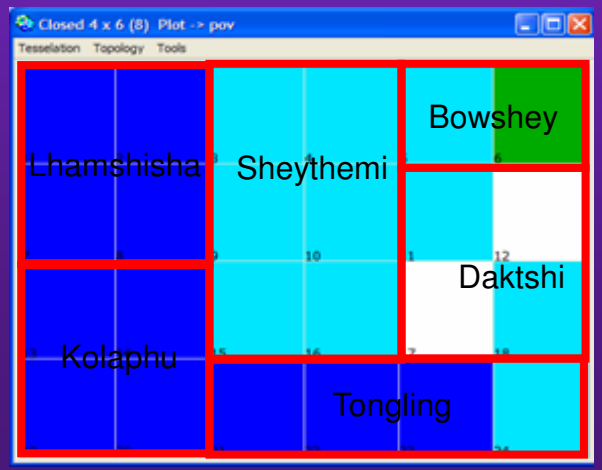


Radi: the collective design of a shared representation

Very active farmer player from Radi proposes that extreme plot should be the best grazing plot as it belongs to the owner in reality

Merak lady proposes two plots empty (or poorest grazing resource) as they represent degraded area in the grazing land

Red Box with Names represents tentative location of parcels of grazing land in the upper catchment of Radi

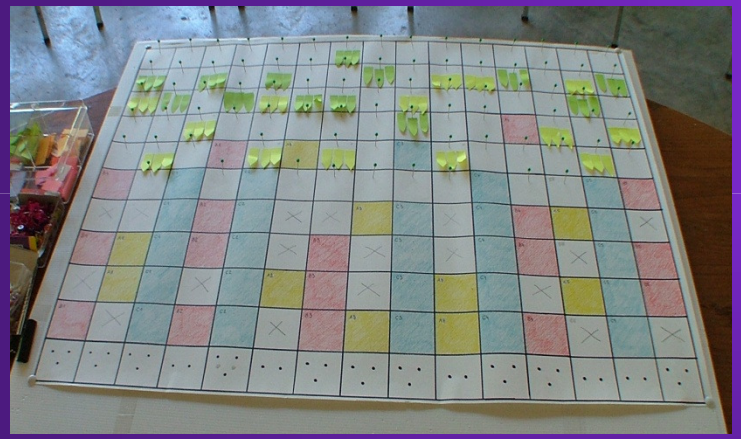


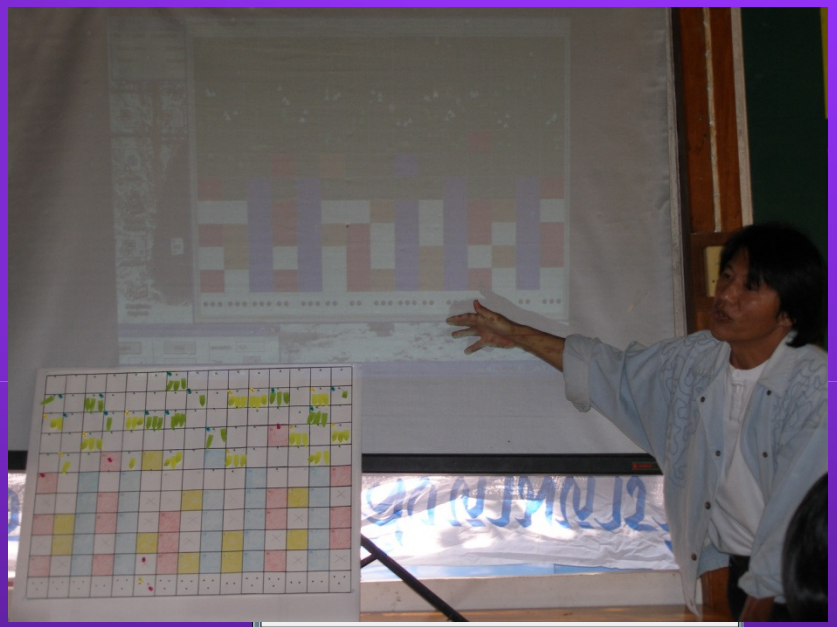
State of resource

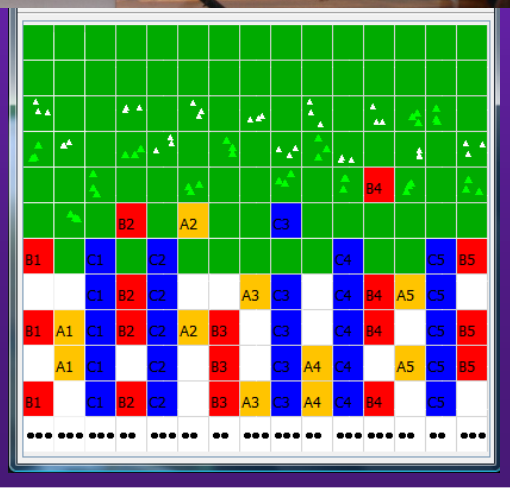
- barren (degraded)
- poor
- medium
- good

Radi: individual then collective scenarios

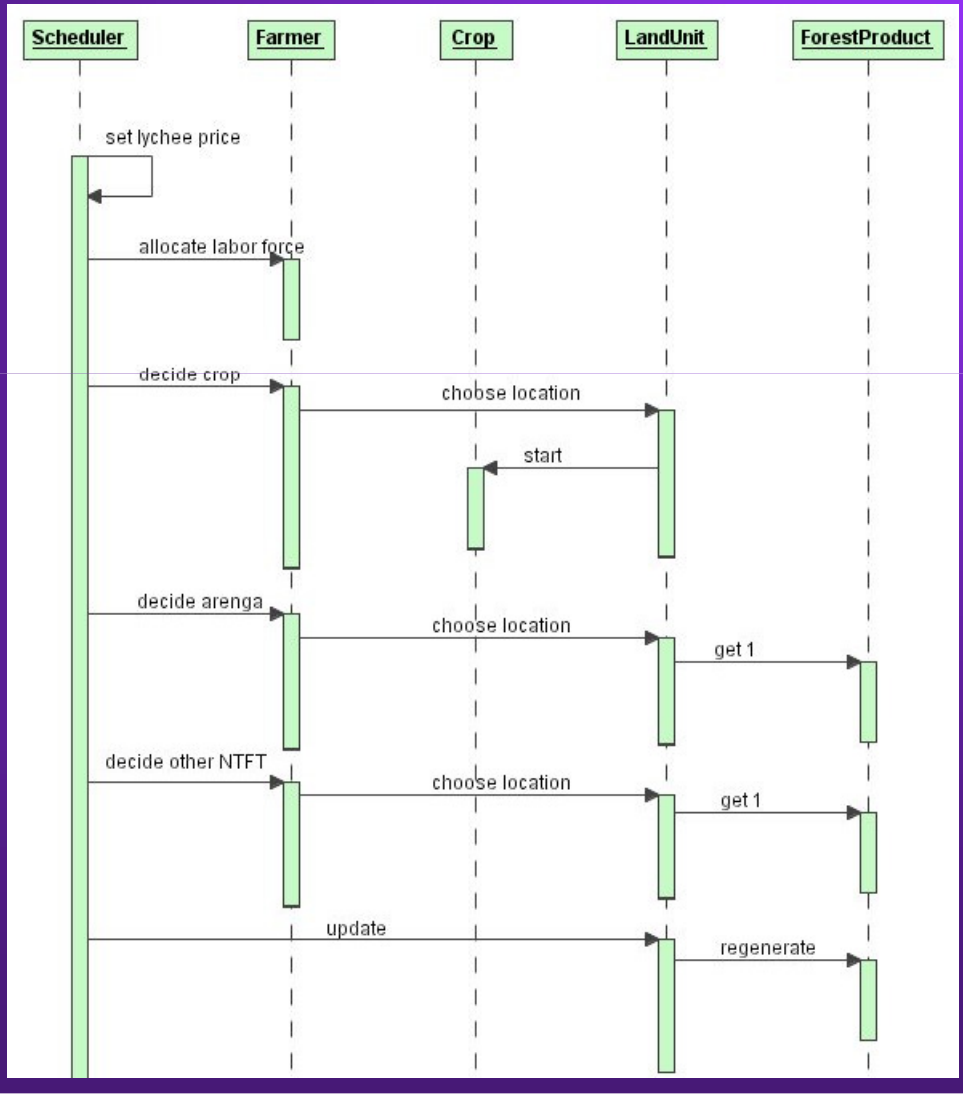
Nam Haen: conflict between villagers and a National Parc in Thailand





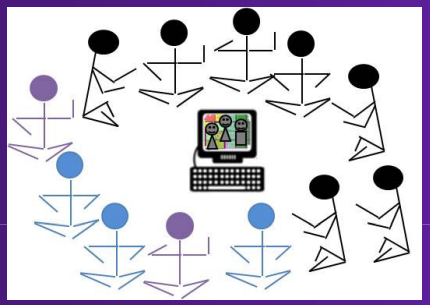


Nam Haen: a unique conceptual model to represent the system…



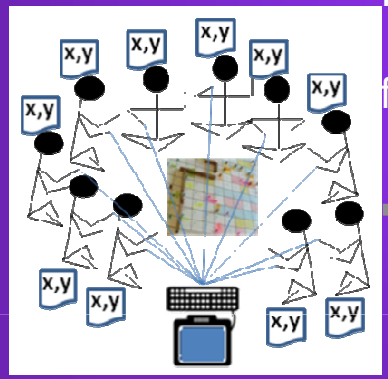
…various versions and modes of use of its implementation

Computer simulation



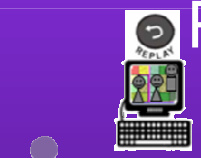
To explore and discuss the scenarios identified

RPG1



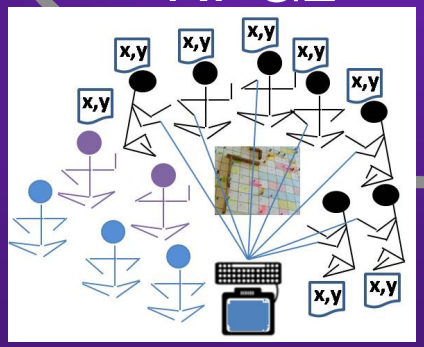
In each village, promote discussion among 12 farmers playing their own role

RPG1 replay



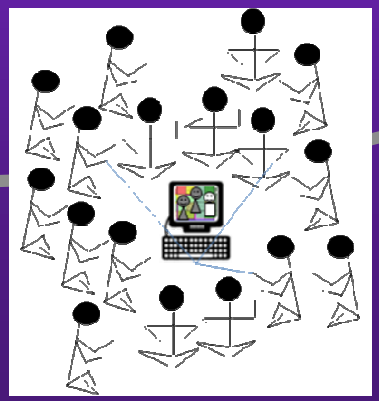
Showcase to National Park officers the principles and the RPG and the outputs of the 2 gaming sessions

RPG2



All the stakeholders together are able to talk about hot issues and to envision possible options fot the future

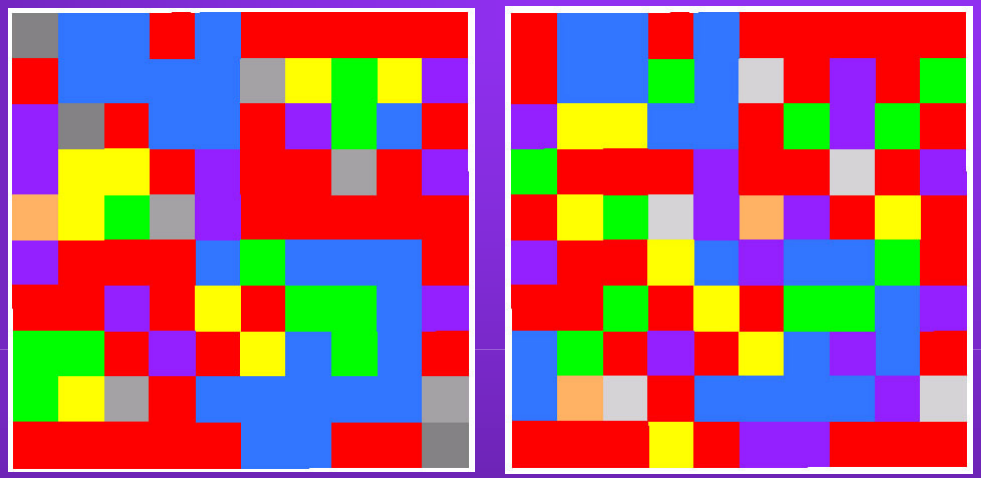
Hybrid computer simulation



In each village, enlarge the group of involved farmers to disseminate information to a larger audience

Some lessons

Existence of patterned behaviours in RPG [SylvoPast]



http://jasss.soc.surrey.ac.uk/6/2/5.html

RPG proved to be an effective mean to elicit knowledge from local stakeholders and embark them in the collaborative design of a computer simulation model. Along the journey, it is fostering their critical thinking by enabling reflexive thoughts about their perceptions and practices